AGRICULTURAL Research

U.S. DEPARTMENT OF AGRICULTURE

OCTOBER 1971

"5"

AGRICULTURAL
Research

October 1971/Vol. 20, No. 4

Potato Renaissance

Thousands of years ago Indians in the lofty valleys of the Andes wrested a priceless if not immediately popular gift for mankind, the potato. Gold-seeking Spaniards brought specimens home but regarded the strange tubers as food fit only for slaves. Centuries passed before Europe accepted the potato. Many Christians spurned it as food because it was not mentioned in the Bible. The few importations into England from Spain were valued as botanical curiosities and acquired, as rare and costly foodstuffs often do, an unfounded reputation as an aphrodisiac. But in the 17th century the medievalist's "apple of love" was introduced into Ireland where the poverty-wracked peasantry embraced it as the cheapest and easiest to prepare of all foods. This set the stage for a great human tragedy.

The potato is more than a nutritious food; it can also be a weapon for the exploitation of weak social classes. In Ireland, while high rent extracted by landowners for a fixed quantity of land was the cause of poverty, the potato—cheap food of the burgeoning masses—perpetuated the system. Thus the nation was victimized by the simplicity of its diet. When blight devastated the potato crops of 1845 and 1846, more than one million people died through starvation and disease.

Ironically, immigrants from Ireland introduced the potato into the American colonies at Londonberry, N.H., in 1719. Soon the potato gained an honored place in the American diet, but its popularity began to ebb in 1910. By 1950 consumption fell to almost half the 1910 level. ARS scientists helped arrest the decline by finding better ways to breed, grow, store, process, and distribute this versatile vegetable. A major achievement was to save preparation time for busy homemakers by developing methods that turned about 40 percent of the crop into convenience foods. Today, whether eating at home or away, we do not consider potatoes a poor man's food but enjoy them served fresh or in a myriad of processed forms. A few ARS processing achievements include developing potato flakes and dehydrofrozen potatoes and improving potato granules.

What of the future? Potatoes still labor against the misconception that they are a starchy, fattening food; this can be remedied by nutrition education. Someday the potato, acclaimed as a well-balanced food which can maintain good health merely through the addition of milk, may be enhanced by fortification. This versatile vegetable will always be welcome in the world's market baskets.

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COVER: In studies of the TCDD contaminant in some pesticides, soil scientist Charles S. Helling examines X-ray film exposed to glass plates which had been spread with a soil slurry (page 8). Small amounts of pesticide and TCDD, both radioactively labeled, were applied to the plate. The streaks on the film were made by the pesticide as it moved through the soils; the dots by TCDD, which was immobile (371A374–9).

AGRICULTURAL RESEARCH is published monthly by the Agricultural Research Service (ARS), U.S. Department of Agriculture, Washington, D.C. 20250. Printing approved by the Bureau of the Budget, June 1967. Yearly subscription rate is $1.50 in the United States and countries of the Postal Union, $2.00 elsewhere. Single copies are 15 cents. Send subscription orders to Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Use of commercial names and brands is for identification only and does not imply endorsement or approval by USDA or ARS. Information in this magazine is public property and may be reprinted without permission. Credit will be appreciated but is not required. Prints of photos are available to mass media; please order by photo number.

Clifford M. Hardin, Secretary
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Dr. Clark and an animal handler at the Mission facility check a Suffolk sheep that shows clinical signs of field scrapie. These signs affect both sides of the animal and consist of skin lesions, loss of wool and incoordination (1270A1171–16).

SCRAPIE:
checked but untamed

SCRAPIE, an insidious disease that has plagued sheep and goats for more than 200 years, may well be rare indeed in this country before the causative agent is identified.

A State-Federal program is the reason—the Cooperative Scrapie Eradication Program—credited by Dr. Albert L. Klingsporn, ARS chief staff veterinarian, with making more progress in the past 5 years than ever before. The program offers the best—and only—opportunity at present for holding the disease in check.

Begun as an emergency measure in 1952, the program has been developed and modified by ARS and State scientists, regulatory officials, and industry representatives to handle all outbreaks routinely. Program procedures are supported by results gained since 1964 when field trials were begun at Mission, Tex. There, under the direction of Dr. Wilbur Clark, supervisory veterinarian, ARS scientists maintain and breed sheep under close observation to study scrapie incidence rates, methods of spread, and to equate the scrapie developed in the laboratory to the naturally occurring disease. The Mission facility permits the purchase and holding of animals from infected flocks for observation under natural conditions for an extended period of time. Before the program, exposed animals were slaughtered and there was no opportunity to record progression of the disease.

The program as practiced now calls for the complete destruction of all bloodline sheep or goats, meaning the affected animal, the sire, dam, all full or half-brothers and sisters, and all its descendants. As a corollary measure, all exposed, nonbloodline sheep are quarantined and inspected periodically. When scrapie involves more than one

bloodline in the same flock or when quarantine or inspection cannot be maintained adequately, the entire flock is slaughtered. Such drastic measures are proving effective in preventing widespread dissemination, but it is difficult to predict whether they will achieve eradication. Without serological tests or other methods of early detection, eradication poses a vexing problem.

The Mission field trials have already proved that scrapie is much more costly than had been thought. The studies have also shown that scrapie can be spread by contact from affected sheep and goats to nonbloodline sheep and goats of various breeds and that probably no breed is entirely resistant. For instance, the only Rambouillet or Targhee sheep and the only Toggenburg or Nubian goats ever known to develop scrapie in the United States had been raised with scrapie-infected animals at Mission. Nowhere else in the world has a sheep of the Targhee breed ever been known to have scrapie.

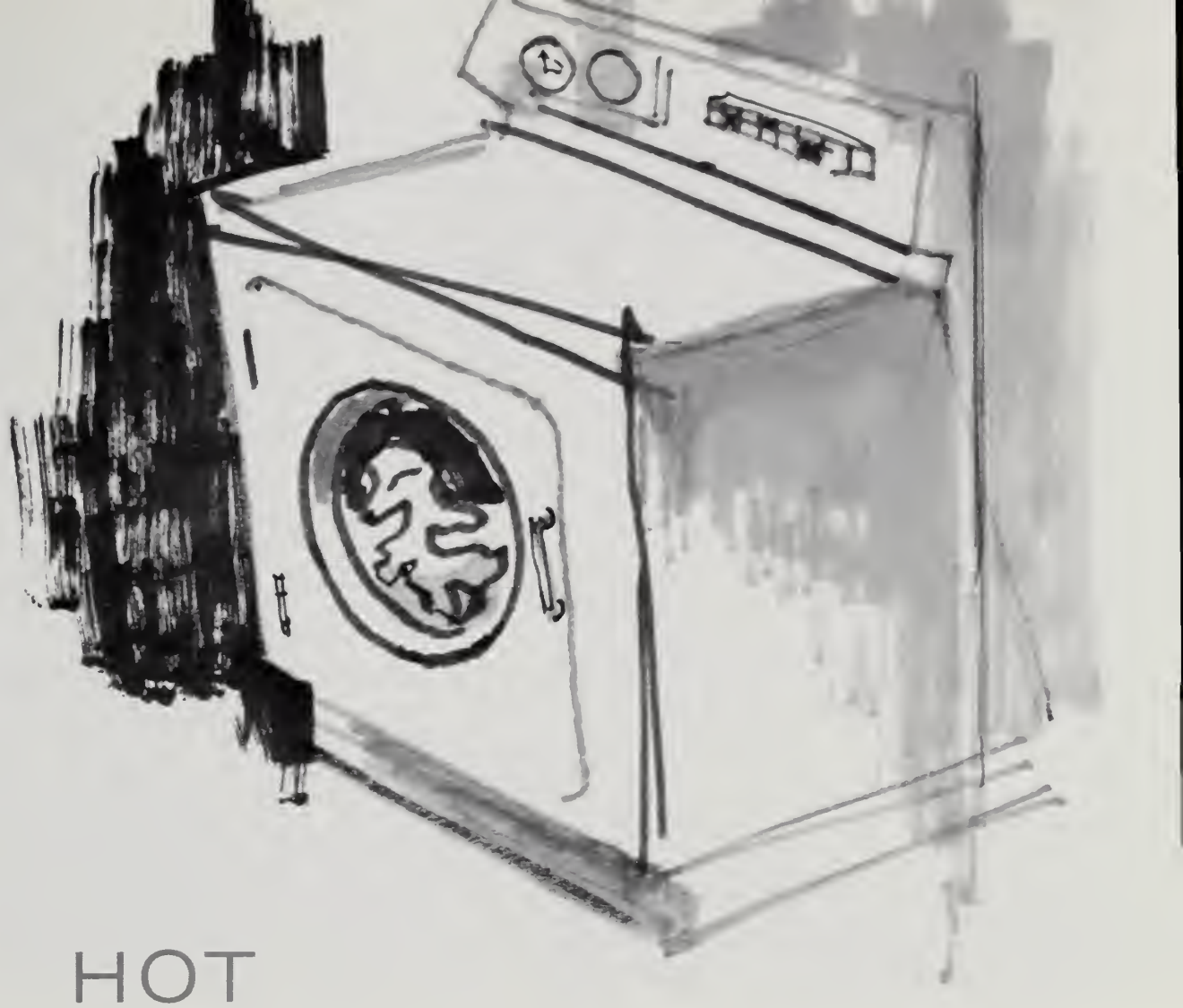
The disease itself is characterized by an unusually long incubation period—18 to 42 months or longer, and by a progressive degeneration of the central nervous system, causing the animal to scratch and acquire a ragged look through loss of wool and skin damage. Affected animals become incoordinated and debilitated; practically all die within 1 to 6 months after showing clinical signs of scrapie.

The causative agent, yet to be identified and viewed by an electron microscope, may be smaller than the smallest known virus. It is unlike almost all known disease organisms: It is more resistant to physical, chemical, and other inactivating agents than viruses are known to be. It can survive rapid cycles of freezing and thawing. It has maintained its virulence after being kept in 10-percent formalin for over 2 years. And researchers have found it to be extremely resistant to heat.

Research has revealed a marked similarity between scrapie and some of the neurological diseases of man and animal such as transmissible encephalopathy in mink as well as kuru, Creutzfeldt-Jacob, and multiple sclerosis in man. No link of scrapie to human diseases has been proved. Neither is there evidence that scrapie can be transmitted to man. Research institutions conducting tests in this field use tissue and sera from naturally scrapie-infected animals that are maintained in a "tissue bank" at Mission—the only ready supply available in the United States.

Although scrapie was first reported in the United States in 1947, it is now considered endemic to this country. However, experts believe that the eradication program has succeeded in preventing widespread dissemination, thus holding this mysterious disease in check until scientists track down its elusive agent. □

Left: *Angora goat gets eartag coded for positive identification. Color of tag indicates whether animal has history of scrapie in previous generations (1270A-1169–15).* ***Below:*** *Dr. Clark examines affected sheep. Daily observation permits isolation of scrapie-positive animals (1270A1171–26).*



HOT WATER WASH

reduces virus contamination in fabrics

SINCE BIBLE DAYS when priests ordered the clothing worn by lepers to be burned or washed, man has been concerned with the possibility that micro-organisms responsible for infectious diseases can be spread or "carried" by fabrics.

ARS-sponsored studies have established that certain viruses do persist for significant periods of time on fabrics typical of those used in clothing and household textiles, both potential disseminators of disease. These studies also indicate that the viruses are readily transferred from one fabric to another—and potentially to any object. Information on their survival and dissemination is necessary if protective measures are to be taken.

As a step in this direction, scientists at the Southern Research Institute, Birmingham, Ala., in research sponsored by ARS, studied the effect of home-style laundering on six fabrics previously contaminated with poliovirus. Poliovirus was used because it persists for significant periods of time on certain textiles.

Fifteen swatches of each fabric were attached to strips of the same fabric and exposed to virus by direct contact. An equal number of similarly attached swatches were exposed by aerosol spray. After exposure to virus, all swatches were stored for 16 hours at 77° F. and 35-percent relative humidity. Five of the swatches were then detached and their virus content determined. These swatches served as controls. The other 10 were placed in a standard top-loading machine with appropriate wash, rinse, and spin-dry cycles. Half were assayed for virus content at the end of the spin-dry cycle, and half after storage for 20 hours at 77° F. and 35-percent relative humidity. Five sterile swatches were included in the washload to see if virus-free fabrics became contaminated when washed with virus-containing fabrics.

Poliovirus-contaminated cotton sheeting, cotton terry cloth, washable wool shirting, wool blanketing, dull nylon shirting, and dacron-cotton shirting were laundered in both warm water (100 to 109° F.) and cold water (70° to 80° F.). All fabrics except the two wools were also laundered in hot water (129° to 140° F.). Two complete series of launderings were carried out for each fabric after contamination by direct contact and after contamination by aerosol—one with an anionic detergent, the other with a nonionic detergent, the two types of laundry detergent on the domestic market.

The two detergents showed little difference in virus-removing ability, but the temperatures of the wash water did. Very little detectable virus remained after washing in hot water. Although washing in warm water or cold water decreased virus content, significant amounts of virus remained in the moist fabrics. Warm water was somewhat more effective than cold in removing virus. On drying, the virus content of all fabrics declined further, often to below detectable levels. With few exceptions, virus reduction was not markedly different on the various fabrics.

Sterile fabrics laundered with fabrics that contained virus were often contaminated during the laundering process. However, when hot water was used, the amount of virus detected on the originally sterile fabrics was very low.

In each laundering, water samples were removed near the end of the rinse cycle. Analysis of these samples revealed no active virus when the fabrics were washed in hot water. When fabrics were washed in cold water or warm water, the rinse water contained some virus, indicating that waste water from laundering can be a source of contamination. □

ARS official Marvin Dykes inspects blacklight trap for insects. The trap contains several of these screens in graduating sizes. This trap is located at Norton Air Force Base in Riverside, Calif., in the storage area for air cargo from Vietnam (371X212–33).

In the cargo discharge area at Norton, ARS official Dean Gardner locks a trap after it has been cleaned (371X212–26).

SILENT SENTRIES

THE BLACKLIGHT TRAP stands silent watch over U.S. agriculture.

Developed by ARS agricultural engineers and plant protection officials, this device has become a primary detection tool in an increased surveillance network aimed at keeping new insect pests out of the United States. The trap takes advantage of the attraction of most insects to the blue and ultraviolet region of the electromagnetic radiation spectrum.

The foremost objective of the detection program is to provide an early warning system by finding new pest introductions promptly. This country's agriculture can ill afford another European corn borer, pink bollworm, or other foreign insect pest. Blacklight traps may also intercept specimens and eliminate potential population buildups of newly introduced pests.

Early detection protects the environment in two ways. The earlier an insect is detected, the easier it is to eradicate before it can injure the environment. And the less pesticide is needed for effective control.

The traps are in operation at 137 air and water ports of entry. In 1970, the program was expanded to include more key areas where the hazard of introduction is greatest—75 blacklight traps were installed at 15 military bases throughout the contiguous United States and Hawaii. This year, 55 improved blacklight traps are scheduled for installation at 11 more military bases. Plans call for extending this detection program to additional ports of entry next year.

Perhaps the largest problem facing ARS plant protection officials is providing the taxonomic support for the program—trap collections are submitted for identification each week. In some locations, more than a gallon of insect material can be collected in one night. Several State universities and ARS taxonomic facilities are cooperating in identifying the trap catches.

Other aspects of ARS' increased surveillance network include biological and chemical soil treatments and the use of sex lure traps. This integrated program should provide added protection to U.S. agriculture. □

PEARS for the EAST

New canning varieties show better fire blight resistance

THE BARTLETT PEAR, grown mainly on the West Coast, reigns supreme over other varieties as king of the pear processing industry, but it may one day have tough competition from pear varieties grown in the East.

Nineteen new pear varieties were evaluated for canning potential by the New Jersey Agricultural Experiment Station, New Brunswick, under a contract with the ARS Eastern marketing and nutrition research laboratory, Philadelphia, Pa. ARS chemist Claude H. Hills supervised the research. Dr. G. Robert Dimarco was principal investigator at the experiment station.

The varieties were selected for fire-blight resistance over a period of 3 years from many new varieties developed by ARS and the New Jersey and New York Agricultural Experiment Stations. Because of fire-blight, a serious bacterial disease, most quality pears are grown commercially on the Pacific Coast. The 19 new varieties have improved resistance to fire-blight.

In the evaluation studies, each variety was canned as halves or processed as a puree, dehydrofrozen slices (slices which have been frozen then dried), or slices packed in a low-calorie sweetener. The products were then compared with similar commercial products made from Bartlett pears.

One new variety was judged by a panel to have "Bartlett-like" flavor, texture, and color. It was highly recommended for processing in low-calorie packs.

The appealing deep golden yellow color and rich flavor of another selection made it an excellent choice for a puree. Commercial purees lack this appealing color.

Several varieties were judged acceptable for both low-calorie pack and puree—some rating higher than present commercial packs.

Only one variety was suitable as a dehydrofrozen product.

Further field tests will be made on all 19 varieties before recommendation can be given for commercial planting.

Plant material is available from the New Jersey Agricultural Experiment Station for distribution to interested commercial plant breeders. □

FURTHER breeding experiments may help eliminate the small, hard, grit-like cells found in the flesh of pears. These cells ruin the smooth texture of the pear and reduce its appeal to the consumer.

Scientists evaluating the new pear varieties observed that some pears developed a dark brown color when cut. These pears also had a high content of free phenolic compounds—chlorogenic acid, in particular, and only small numbers and sizes of grit cells. When the browning was moderate or low, the incidence of grit cells was high. This indicates that the phenolic compounds may condense to form grit cells, a tendency that seems to be genetically transmitted.

Crossing a European and an Oriental pear produced a hybrid with many large grit cells. These hybrids also exhibited characteristics which resulted in the production of lignin, the substance which composes grit cells.

By determining what factors affect grit cell formation, the scientists may be able to find ways to reduce or eliminate this problem.

Above: Dr. Helling spreads a soil slurry over glass plates in preparing to trace pesticide movements in soil. Five soils with varying characteristics were used in the study (371A271–15).

Right: Two tests were performed to check translocation of TCDD in plants. In one test TCDD was applied to the foliage, as shown here; in the other, plants were grown in treated soil. Both tests showed no translocation under normal application conditions (471A304–7).

Left: After the slurry on the plates is dried, Dr. Helling applies the pesticide compounds, which are radioactively labeled. Up to seven compounds may be used on each plate (A272–14). Right: He immerses treated plate in water to instigate movement of compounds. X-ray film is then exposed to the plates for 3 to 5 days to provide a record of the movement (371A276–7).

A Close Look at TCDD

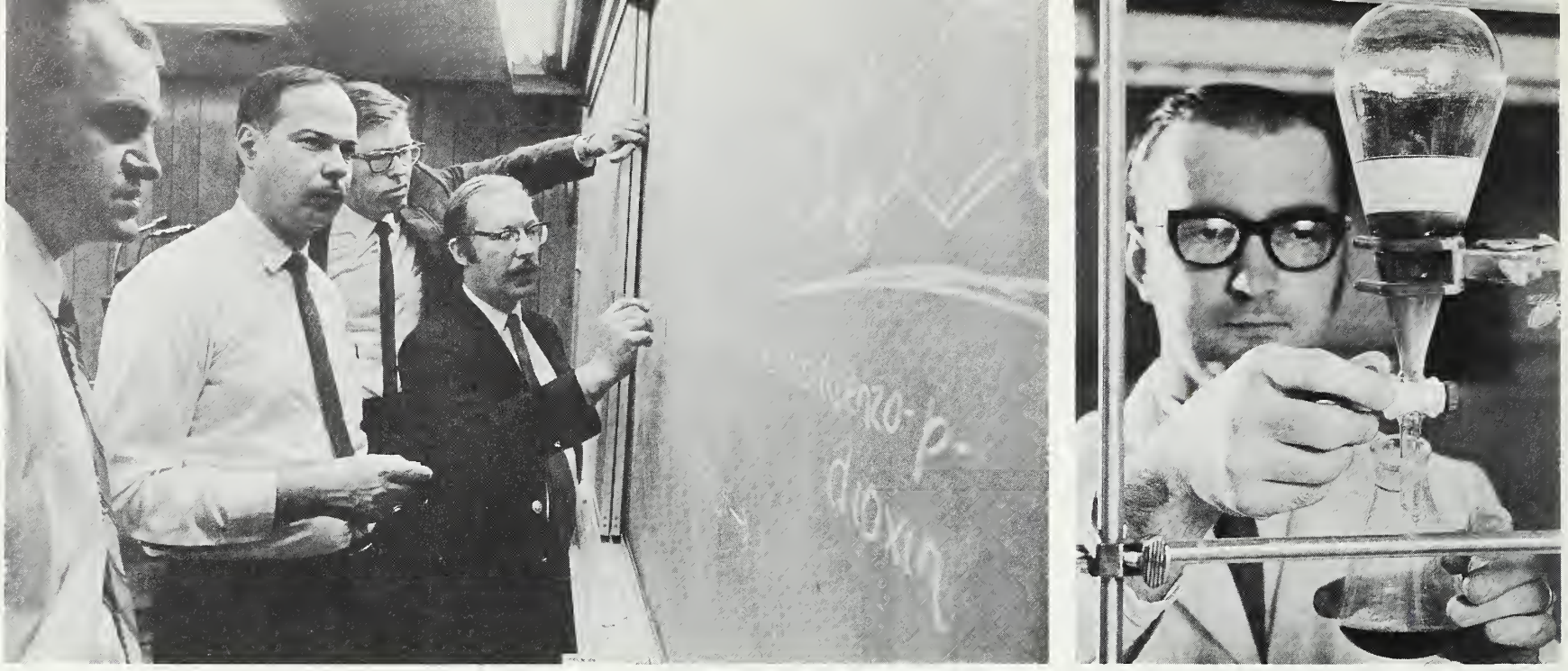
A HIGHLY toxic substance that may occur as a contaminant in a few pesticides synthesized from chlorophenols is under intensive study by ARS scientists to learn its chemical and environmental significance.

The contaminant, 2,4,7,8-tetrachlorodibenzo-p-dioxin (TCDD), is formed during the manufacture of some chlorinated phenols when temperatures exceed known safe limits. The substance has been a contaminant in some commercial formulations of herbicides and an important consideration in the recent review of uses of the herbicide 2,4,5-T.

TCDD causes chloracne, a condition characterized by skin eruptions and irritations on the face, arms, and shoulders. Chloracne was first described in Germany in 1899, but not until the late 1950's was TCDD pinpointed as a causative agent. Chloracne occurred in 1964 in a 2,4,5-T manufacturing plant.

Synthetic TCDD is highly toxic to mammals and a powerful teratogen (fetus-deforming agent). Tests in mammals reported in 1970 indicated that some commercial samples of 2,4,5-T contaminated with high levels of TCDD were potentially teratogenic. As a result of the concern that arose from these biological tests, ARS initiated a high-priority research program to assess the significance of TCDD in 2,4,5-T and similar chlorophenol-based pesticides in the environment.

The ARS studies on TCDD in the chlorinated compounds, with particular



Left: *Dr. Isensee, Dr. Kearney, Dr. Helling, and Dr. Plimmer, four scientists involved in the intensive studies, discuss TCDD at a blackboard (471A301–22).* ***Right:*** *Dr. Woolson screens chlorophenol-based pesticides for TCDD contamination. Procedures devised for this work can detect 0.1 parts per million TCDD (371A273–14).*

emphasis on 2,4,5-T, were started in February 1970 at Beltsville, Md., by a research team led by biochemist Philip C. Kearney.

"Our research," said Dr. Kearney, "shows that TCDD is immobile in soil, it is relatively persistent but not readily taken up by the plants nor translocated to other plant parts, and it can be washed off plants."

Dr. Kearney also said, "We are certain that TCDD is not produced biosynthetically from 2,4,5-T in soils, nor in any other manner except in the manufacturing process. Therefore, current regulations and careful quality control during manufacturing can assure that the environment is protected from ill effects of TCDD-contaminated 2,4,5-T."

To detect and measure accurately the TCDD contamination in chlorophenol-based pesticides, chemist Edwin A. Woolson and former ARS chemist Ronald F. Thomas devised extraction, cleanup, and electron-capture gas-chromatographic procedures capable of detecting about 0.1 ppm TCDD. Identification in selected samples was further confirmed by several techniques including mass spectrometry.

Using these procedures, the chemists, assisted by technician Peter D. J. Ensor, analyzed 42 commercial samples of 2,4,5-T. Results showed that 2,4,5-T produced after April 1970 contained less than 0.5 ppm TCDD—although higher levels were found in certain older samples.

Chemist Jack R. Plimmer, who examined the photochemical stability of TCDD, found that, in a methanol solution in a closed system, approximately one-half of the TCDD had been changed in 3.5 hours when exposed under a sunlamp. TCDD in methanol in a closed system also rapidly decomposed under natural sunlight. On a soil surface, preliminary data on the photochemical degradation of TCDD indicated that the process would be slow.

The movement of 2,4,5-T and TCDD in five soils of widely differing characteristics was studied by soil scientist Charles S. Helling. Using soil thin-layer chromatography (AGR. RES., June, 1968), Dr. Helling verified that 2,4,5-T moved extensively in sandy soils, moderately in clay soils, and only slightly in muck. He found, however, that TCDD was immobile in all soils studied and remained on the surface where it was applied.

There is virtually no chance of TCDD entering the food chain as a result of normal agricultural uses of 2,4,5-T. Plant physiologist Allen R. Isensee determined that plants do not absorb nor translocate TCDD from the soil except at extremely high levels of treatment, nor do they translocate the material after foliar applications.

Dr. Isensee grew oats and soybeans in the TCDD-treated soil. He harvested part of each crop at 6-, 10-, 15-, 20-, and 40-day intervals and at maturity, then analyzed the plants for TCDD. Labeling TCDD with a radioactive material permitted measurement of quantities as low as 1 part per billion. No detectable TCDD was found in any mature plant tissue or the grain. This was encouraging as the concentration of TCDD in the soil in these experiments was approximately 40,000 times greater than the amount that would be deposited in soil from a 2-pound-per-acre application of 2,4,5-T contaminated with 1 ppm of TCDD incorporated in the top ⅓-inch of the soil surface. The scientist did detect small amounts in young plants.

Also, unlike 2,4,5-T which is known to move into plants after foliar applications, TCDD remained on leaf surfaces. However, Dr. Isensee found that about half the original TCDD applied in a carrier could be washed off the plants by simulated rainfall occurring 2 hours after application. Subsequent washings failed to remove any additional significant amounts. □

Trees yield Potential Food Preservatives

NATURAL COMPOUNDS from Indian and Brazilian trees highly resistant to pest organisms have prevented growth of a wide range of food-spoilage organisms in preliminary tests.

Chemicals from the two pest-resistant trees are among about 200 natural compounds that were screened as possible new food preservatives at the ARS Western regional research laboratory, Berkeley, Calif.

Chemical preservatives are necessary to avoid microbial spoilage of many food products. Synthetic food additives have long been employed for this purpose, but regulatory agencies are stepping up efforts to reappraise chemicals now used, and replacements may have to be found for some of them.

The ARS scientists reasoned that screening natural plant compounds might be rewarding, since many plants protect themselves against pest organisms either with compounds in their tissues or with compounds made in response to challenges by pest organisms. Because a compound is natural, it is not necessarily safe for use in food; any found to have outstanding antimicrobial properties must pass toxicity tests before it can be accepted for use in foods.

Chief chemist Leonard Jurd coordinates the screening program at the Berkeley laboratory. Other participants are microbiologist A. Douglas King, Jr., and chemists William S. Stanley, Kenneth Stevens, and Keiko Mihara.

In tests conducted so far, the natural compound with the greatest antimicrobial properties is obtusastyrene, one of an unusual group of flavonoids, the o-cinnamyl phenols. These compounds were isolated in 1966 from the heartwoods of *Dalbergia sisoo*, a valuable timber tree in India, and a related Brazilian species, *Dalbergia nigra*. The compounds also have been isolated from the Brazilian *Machaerium* species.

The cinnamyl phenols have been especially effective in inhibiting fungal growth. At a concentration of 6 to 100 ppm obtusastyrene, the most effective, completely inhibited growth of all the molds and yeasts examined. This compared favorably with the activity of two commercial additives, o-phenyl phenol and propyl-4-hydroxybenzoate. O-phenyl phenol inhibited fungal growth at 50 to 200 ppm concentration, and propyl-4-hydroxybenzoate at 200 ppm.

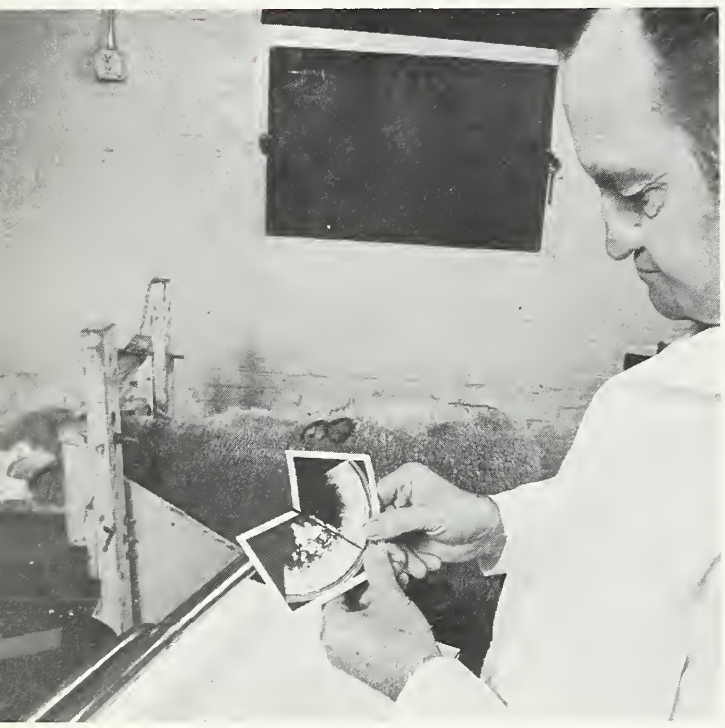
At 25 ppm, the lowest concentration, obtusastyrene also inhibited the growth of all Gram positive bacteria tested and some species of Gram negative bacteria. Gram positive or negative refers to a method of classifying bacteria based on their reaction to a stain. Propyl-4-hydroxybenzoate did not stop bacterial growth at concentrations lower than 400 ppm; the lowest effective concentration for O-phenyl phenol was about 100 ppm.

Effectiveness at these low concentrations indicates that the cinnamyl phenol compounds are good antimicrobial agents. The preliminary screening tests were not intended to determine their suitability for use in foods; this must be determined by other tests.

Most of the initial screening tests were conducted in petri dishes with standard culture media providing nutrients for organism growth. Organisms used in the tests are selected to provide a representative sample of those encountered in food spoilage. □

Right: Bertram Wells, a college student employed for the summer, applies the scanner guide to a ewe (671X802–10).

Below: Mr. Lindahl puts two Polaroid prints together to form composite photo of the right and left sides of a ewe (671X802–5).



... in pregnant ewes

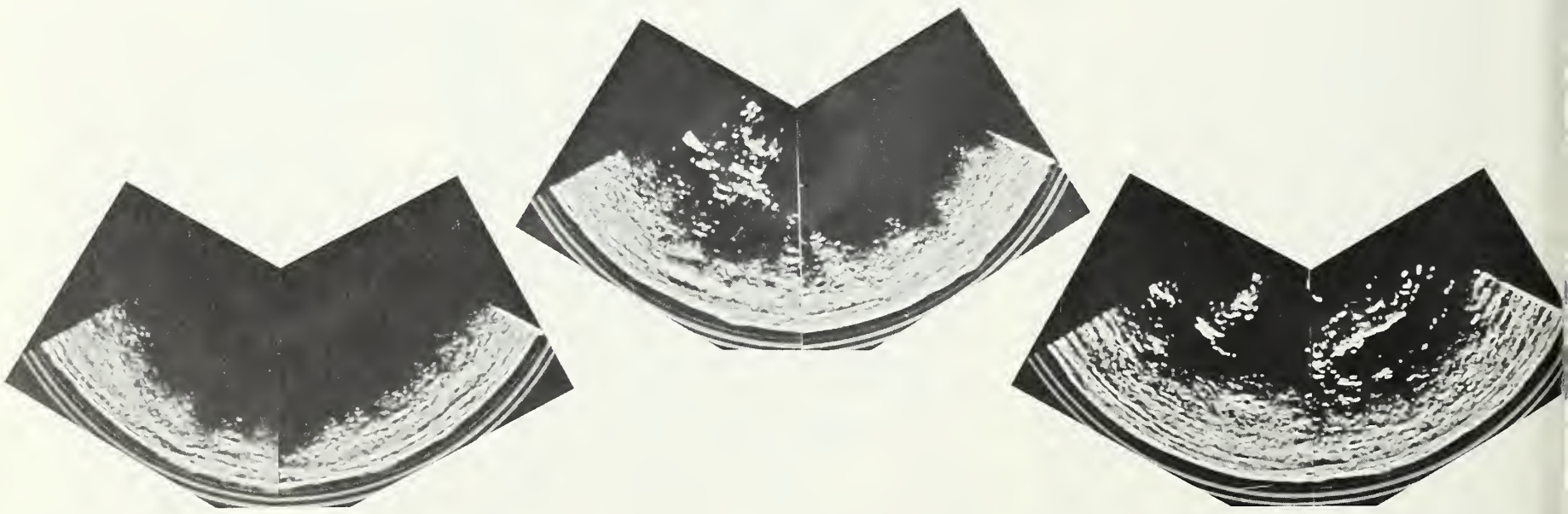
SOUND DETECTS TWINS

ONE, two or three lambs—echoed sound reveals how many a ewe is carrying.

This detection system employs an ultrasonic scanner, the same instrument developed by Cornell University to measure the backfat and loin eye area of cattle, sheep, and swine. When working with ewes, the scanner produces a high-frequency sound that echoes when it strikes the fetus. These echoes are recorded on film by a camera mounted on the scanner.

In earlier pregnancy detection research, ARS scientists used the ultrasound Doppler technique in which a probe is inserted into the rectum of a ewe held on her back. This technique is about 90 percent accurate in detecting pregnancy but can not distinguish single from multiple fetuses.

Estimation of the number of fetuses



These three composite photos show patterns formed in the scanning of a nonpregnant ewe, one carrying a single lamb, and one carrying twins. Curved lines represent layers of skin and fat (PN–1975).

before lambing is extremely important to the sheep producer. Ewes carrying more than one lamb require a high level of nutrition during the last 4 to 6 weeks before lambing to prevent pregnancy disease, or ketosis. Ketosis is rare in ewes having only a single lamb. Ewes with multiple fetuses also require more assistance during lambing than ewes with a single fetus. Separation of ewes carrying multiple lambs from those with only a single lamb can save sheep producers millions of dollars annually through reductions in feed costs and losses of lambs and ewes.

The ultrasonic scanner is a fast, safe, and economical method of predicting the number of fetuses a ewe is carrying. Previously, the only accurate way of counting the number of fetuses was through X-rays, which are time-consuming, costly, and potentially hazardous.

After preliminary studies conducted in cooperation with animal scientist James R. Stouffer of Cornell University, ARS sheep nutritionist Ivan L. Lindahl and ARS technician S. Lynn Brobeck scanned 100 pregnant ewes from 28 to 52 days before lambing. Fifty ewes with a single fetus and 40 ewes with multiple fetuses were correctly identified—90 percent. Only two ewes with multiple fetuses were diagnosed as having single lambs. Eight ewes suspected of having multiple fetuses had only one lamb.

To prepare the ewe, a narrow band of wool is clipped about 4 inches behind the navel, up the right and left sides. The sides are scanned separately using a reference point on the midline of the ewe's abdomen. The resulting two pictures are then put together to form a composite picture. The fetuses show up as collections of white areas. A scan of nonpregnant ewes shows only the skin with the underlying layer of fat. Three men working as a team can prepare and scan a ewe in 4 minutes. Since the photos are Polaroid, the results are immediately available. □

'COSMETIC' for calfskins

CALFSKINS make beautiful shoes and handbags. But the appearance of veins on the surface of some skins makes them less desirable in manufacturing quality products—particularly glazed calfskin products.

"Veininess" is most prevalent in spready or thin skins weighing from 5 to 7 pounds. Millions of dollars are lost every year by tanners who must sell these blemished skins at reduced prices. As yet, no single cause for veininess has been determined (AGR. RES., July 1965, p. 8).

However, ARS chemist Mary V. Hannigan of the Eastern marketing and nutrition research laboratory, Philadelphia, Pa., has found that several fillers or resins can be used to "fill in" the channels left by the veins. This makes the defect less noticeable and increases the value of the finished skins.

Tests were made on calfskins "in the blue," skins that had been chrome-tanned but not as yet dyed or glazed. Usually, veininess appears on the grain surface after tanning. The vein channels are then accentuated in the finishing process when the glazing jack, a heavy agate ball drawn across the skin, applies pressure to the leather.

Miss Hannigan took in-the-blue skins and slit them down the backbone. The left sides were treated with one of the many filling agents or resins being tested, while the right sides were left untreated. Both sides, along with some whole skins that had been treated, were finished into leather by a commercial tannery.

The skins treated with a polyethylene emulsion, an acrylic polymer, or a zirconium salt showed the greatest improvement in the leather. Comparison of treated and untreated sides showed a marked reduction in veininess and an upgrading of the treated leather. The polyethylene emulsion was the most effective treatment but occasionally caused stickiness of the leather in the finishing process.

The treated sides developed a slightly different shade when dyed than the untreated ones. Color comparable to the untreated skins can be achieved through simple adjustment in the dye formula. The tensile strength of all the leathers was not affected. □

Rodents help control fleas

Bait station containing the dichlorvos pellets placed near rodent burrows in field tests outside of Roswell, N. Mex. (PN–1976).

RODENTS may help man control fleas and thereby stop transmission of plague and other flea-borne diseases.

In the United States, bubonic plague in humans is rare, but by another name, sylvatic plague, it can decimate wild rodent populations. Hungry fleas searching for other hosts increase the risk of transmitting the plague to man. For this reason, the rodent control programs sometimes carried out in recreation areas must also take action to control fleas. At present, this is done by the time-consuming dusting of individual rat burrows and runways, which are often hard to find.

ARS entomologists M. M. Cole and Philip H. Clark at Gainesville, Fla., showed that if an insecticide can be presented to rodents in a sufficiently attractive form, they will carry it into their burrows, thus distributing it themselves. This method would not only simplify the application but would also reduce the amount of insecticide needed, thereby minimizing problems of environmental pollution.

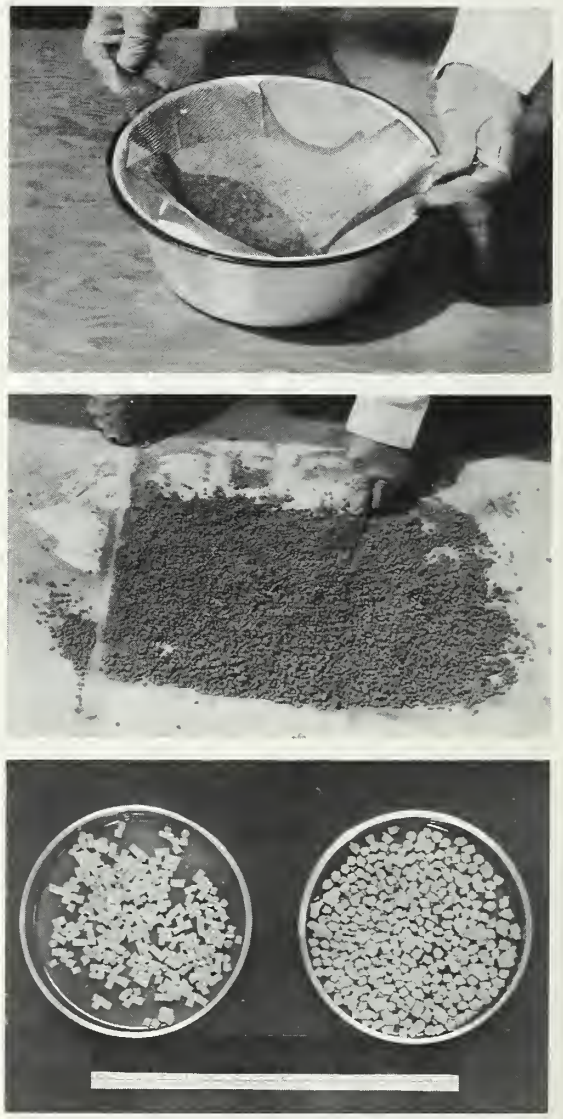
The scientists coated granules of plastic containing the insecticide dichlorvos with a food substance which masked the presence of the insecticide and made the granules acceptable to the rodents. When the rodents stored them in their burrows, the dichlorvos fumes killed the fleas.

The granules worked well in laboratory tests with the oriental rat flea, a major carrier of bubonic plague. Flea mortality rates of 95 to 100 percent were obtained for 9 of the 12 coating materials.

Preliminary field tests were conducted in the vicinity of Roswell, N. Mex., in cooperation with scientists at the New Mexico Department of Health and Social Services, Santa Fe. These tests showed that the granules were acceptable to several species of rodents.

Dichlorvos has not been registered for this use. These preliminary tests show that the method has promise, but further studies are needed to determine its effects on other species of rodents and fleas and to explore the possibility of any undesirable side effects in the environment.

Before a pesticide can be released to the public, it must undergo stringent tests by its manufacturer, who then submits test data and the product to the Federal Government for evaluation and registration. □



At Gainesville, the dichlorvos pellets are dipped in glue, then coated in food material. Bottom photo compares uncoated and coated pellets (PN–1977, PN–1978, PN–1979).

Jean Mayer named Atwater Lecturer

JEAN MAYER, international nutrition authority and member of the President's Consumer Advisory Council, will give the fourth annual W. O. Atwater Memorial Lecture on October 24 in Miami, Fla.

The lecture will be delivered before the Second National Biological Congress under the auspices of the American Institute of Biological Sciences. The Atwater lecture, sponsored by ARS, honors Dr. Wilbur O. Atwater, USDA's first administrator of human nutrition research and the founder of the science of modern nutrition in the United States. Theme of the 1971 Congress will be "Man and Environment II," a continuation of the theme of the first Congress.

Dr. Mayer is professor of nutrition, lecturer on the history of public health, and a member of the Center of Population Studies at Harvard University. A world authority on obesity and energy metabolism, Dr. Mayer is the author of over 400 scientific papers and 40 nontechnical publications.

He has served in various leadership and advisory capacities with United Nations food and health organizations, has lectured extensively in this country and abroad, and has chaired four international symposia on nutrition, endocrinology, and physiology. His leadership in organizing and directing the first White House Conference on Food, Nutrition, and Health in 1969 was vital in producing guidelines for developing a national nutrition policy.

Dr. Mayer (0771X861–8)

Speakers for the Atwater Memorial Lectures are chosen for their outstanding scientific contributions toward improving the ability of people or nations to realize their full potential. □

Virus causes sorghum disease

A VIRUS causes the sorghum grain malady called "small seed disease," which results in high crop yield losses on the grain-rich western plains.

The culprit is the maize dwarf-mosaic virus (MDMV). The link between small seed disease and MDM virus was made by plant pathologists Leon K. Edmunds of ARS and Charles L. Niblett of the Kansas Agricultural Experiment Station, Manhattan.

The severest attacks of the disease occur in the High Plains region where sorghum fields are irrigated. Seeds are smaller than normal and light in weight, with a chalky endosperm. They shatter and are more susceptible to attack by grain head molds. Small seed disease is credited with causing up to a 40-percent cut in sorghum crop yields in some fields.

A specific sequence of events is required for disease development. Virus transmission, via infestation of leaves by greenbugs or corn leaf aphids, must occur after the sorghum heads emerge. The virus then moves to the heads, where it multiplies in the seed-bearing branches. Later, if temperatures drop below 60° F. for several consecutive nights as the grain begins to ripen, dead areas appear on some or all of the branches, and further development of the seed is thereby prevented. Finally, because of premature cut-off of the seed-filling process, the seed shrinks as it ripens, often to less than half its normal size.

These observations were confirmed by reproducing the disease under controlled, experimental conditions in the greenhouse. □

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Subsoiling for higher bean yields

Subsoiling shows promise of increasing yields from three bean varieties in areas where compacted soil results in greater plant damage from *Fusarium* root-rot.

ARS scientists believe that when compact soil impedes growth of bean roots, it predisposes them to damage by *Fusarium*. In their tests the scientists subsoiled the drill rows after seedbed preparation to break the plow sole and allow bean plants to produce larger and more vigorous root systems.

The three bean varieties were selected for their varying resistance to root rot. Bigbend, one of two vine-type Mexican varieties tested, was the most resistant to *Fusarium*. The other Mexican strain, UI–36, was slightly less resistant. The most susceptible variety tested was Royal Kidney, a bush-type bean.

Subsoiling did not retard the *Fusarium* infection. Despite the fungus infection and root rot, the subsoiled beans out-produced plants in fields where soil compaction retarded root growth. It appeared to the scientists that the increase in the root system size accounted for the improved crop yield. The tests were conducted on Ritzville sandy loam soil infested with the *Fusarium* organism.

The scientists also found that subsoiling under the plant rows before planting gave better results than subsoiling between the rows either before planting or after the plants emerged. Barley residues, plowed under before planting the beans, also reduced soil compaction and improved root growth.

Plant pathologist Douglas W. Burke, soil scientist David E. Miller, and research technicians Lyle D. Holmes and Albert W. Barker, all of ARS, conducted the subsoiling research at the Irrigated Agriculture Research and Extension Center, Prosser, Wash.

Soil cleanses polluted air

While man continues to pollute his environment, Mother Nature is busy trying to keep it clean.

Every year automobiles pollute the air with 14 million tons of ethylene—about 90 percent of the total ethylene released into the air.

Ethylene is a plant hormone required in small quantities for 15 to 20 life processes, such as flower initiation, fruit ripening, and defoliation in the fall. But plants die if they receive too much ethylene.

Studies at Beltsville, Md., showed that soil is extremely effective in removing air pollutants. Soil atmosphere was free of measurable ethylene (less than 5 parts per billion) while the air above contained 10 to 40 ppb. The studies were conducted by plant physiologists Fred B. Abeles, ARS; Gerald R. Leather, and Leonard E. Forrence, Department of Defense; and Lyle E. Craker, University of Massachusetts.

Their studies indicate that the soil is removing the ethylene through microbial degradation. The soil also effectively removes other hydrocarbons from auto exhaust, as well as nitrogen dioxide and sulfur dioxide. Pasteurized soil is less effective than untreated soil.

If micro-organisms in the soil did not break down the ethylene into harmless chemicals, plant life on earth in the future would be severely altered.

Correction: USDA awards

The article, "USDA Presents Awards," of the June issue erroneously stated that Dr. Howard R. Haise received the Superior Service Award for soil fertility and management research in the Southeast, Puerto Rico, and Latin America. Dr. Haise actually received the award for creative research and development of automated surface irrigation systems which save labor and water, and for exceptional technical leadership in water management research investigations.

U.S. GOVERNMENT PRINTING OFFICE:1971 O—442-273